

WHAT IS CLAIMED IS:

- Sub C1
1. A duct assembly for coupling a pair of components in fluid connection, the duct assembly comprising:
- a first portion;
  - a second portion in fluid connection with the first portion, the second
- 5 portion being relatively more flexible than the first portion; and
- a support collar coupled to an outer perimeter of the second portion and abutting the first portion, the support collar being sized to prevent the formation of a stress riser at an intersection between the first and second portions to thereby render the intersection less susceptible to tearing in response to
- 10 repeated flexing of the second portion.

002080" 2060E360

2. The duct assembly of Claim 1, wherein the support collar has a cross-section with a generally flat base.

3. The duct assembly of Claim 1, wherein the support collar has a generally circular cross-section.

4. The duct assembly of Claim 1, wherein the support collar has a generally hollow cross section.

5. The duct assembly of Claim 1, wherein the second portion includes a reinforcing helix that is positioned to abut the support collar.

6. The duct assembly of Claim 5, wherein an end of the first portion proximate the intersection has an end portion which is smaller in diameter than a body portion of the first portion.

7. The duct assembly of Claim 6, wherein the diameter of the end portion is approximately equal to an outside diameter of the support collar.

8. The duct assembly of Claim 7, wherein the length of the end portion is equal to a pitch of the reinforcing helix.

9. A duct assembly for coupling a pair of components in fluid connection, the duct assembly comprising:

a duct portion; and

a sleeve portion bonded to an exterior perimeter of the duct portion, the  
5 sleeve portion being coupled to a predetermined area of the duct portion and  
providing the predetermined area with a predetermined characteristic.

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10. The duct assembly of Claim 9, wherein the sleeve portion is formed from polyester and the predetermined characteristic is abrasion resistance.

11. The duct assembly of Claim 9, wherein the sleeve portion is formed from a woven material.

12. The duct assembly of Claim 9, wherein the sleeve portion is formed from a material selected from a group of materials consisting of steel, carbon graphite, kevlar and nextel.

13. The duct assembly of Claim 9, wherein the duct portion is formed from a plurality of plies that are bonded together with a first adhesive material and the sleeve portion is bonded to the duct portion with a second adhesive material, the duct assembly being fabricated in a manner such that the first and  
5 second adhesive materials are cured in a common curing process.

14. The duct assembly of Claim 9, wherein the duct portion is formed from a plurality of plies that are bonded together with a first adhesive material and the sleeve portion is bonded to the duct portion with a second adhesive material, the duct assembly being fabricated in a manner such that the first  
5 adhesive material is cured prior to the curing of the second adhesive material.

15. The duct assembly of Claim 14, wherein the second adhesive material is a silicone adhesive.

16. A method for forming a reinforced flexible duct assembly comprising the steps of:

providing a duct member;

determining a diameter of the duct member;

5 selecting a reinforcement member and a reinforcement pitch based on the diameter of the duct member; and

bonding the reinforcement member to an exterior surface of the duct member in a helix such that a pitch of the helix is equal to the reinforcement pitch.

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17. The method for forming a reinforced flexible duct assembly of Claim 16 wherein the step of selecting the reinforcement member and the reinforcement pitch include the steps of:

5 selecting a reinforcing member having a diameter of about 0.15 inch and setting the reinforcement pitch equal to about three-quarters ( $\frac{3}{4}$ ) of an inch if the diameter of the duct member is greater than seven and one-half ( $7\frac{1}{2}$ ) inches;

10 otherwise, selecting a reinforcing member having a diameter of about one-eighth ( $\frac{1}{8}$ ) inch and setting the reinforcement pitch equal to about three-quarters ( $\frac{3}{4}$ ) of an inch if the diameter of the duct member is greater than five and one-half ( $5\frac{1}{2}$ ) inches;

otherwise, selecting a reinforcing member having a diameter of about 0.10 inch and setting the reinforcing pitch equal to about seven-eighths ( $\frac{7}{8}$ ) of an inch if the diameter of the duct member is greater than four (4) inches;

15 otherwise, selecting a reinforcing member having a diameter of about 0.10 inch and setting the reinforcing pitch equal to about three-quarters ( $\frac{3}{4}$ ) of an inch if the diameter of the duct member is greater than about three and one-half ( $3\frac{1}{2}$ ) inches;

20 otherwise, selecting a reinforcing member having a diameter of about three-thirty-seconds ( $\frac{3}{32}$ ) of an inch and setting the reinforcing pitch equal to about three-quarters ( $\frac{3}{4}$ ) of an inch if the diameter of the duct member is greater than about two and one-half ( $2\frac{1}{2}$ ) inches;

otherwise, selecting a reinforcing member having a diameter of about three-thirty-seconds ( $\frac{3}{32}$ ) of an inch and setting the reinforcing pitch equal to

about five-eighths ( $5/8$ ) of an inch if the diameter of the duct member is greater  
25 than about one and three-quarters ( $1\frac{3}{4}$ ) inches;

otherwise, selecting a reinforcing member having a diameter of about  
five-sixty-fourths ( $5/64$ ) of an inch and setting the reinforcing pitch equal to about  
one-half ( $1/2$ ) inch if the diameter of the duct member is greater than about one  
and one-quarter ( $1\frac{1}{4}$ ) inches;

30 otherwise, selecting a reinforcing member having a diameter of about  
one-sixteenth ( $1/16$ ) of an inch and setting the reinforcing pitch equal to about  
seven-sixteenths ( $7/16$ ) if the diameter of the duct member is greater than about  
one (1) inch; and

otherwise, selecting a reinforcing member having a diameter of about  
35 one-sixteenth ( $1/16$ ) of an inch and setting the reinforcing pitch equal to about  
three-eighths ( $3/8$ ).

002080" 2060E960



18. A method for forming a hose assembly for coupling a plurality of components in fluid connection, the method comprising the steps of:

forming a rigid duct structure and a flexible duct structure; and

bonding the flexible duct structure to an end of the rigid duct structure to  
5 produce a clampless flexible joint which permits an end of the flexible duct structure opposite the rigid duct structure to be moved relative to the rigid duct structure.

002080" 2060E960

19. The method of Claim 18, further comprising the steps of:  
providing an elastomeric attachment sleeve; and  
bonding the elastomeric attachment sleeve to an end of the rigid duct structure opposite the flexible duct structure.
20. The method of Claim 18, wherein the flexible duct structure includes a plurality of bellows.
21. The method of Claim 20, wherein the plurality of bellows are reinforced with a reinforcing member.
22. The method of Claim 21, wherein the reinforcing member is formed from a thermoplastic.
23. The method of Claim 18, wherein an end of the rigid duct structure includes a beaded end portion.
24. The method of Claim 18, wherein the rigid duct structure is formed from a material selected from a group of materials consisting of metals, plastics and composites.

25. A method for forming a hose assembly for coupling a plurality of components in fluid connection, the method comprising the steps of:

forming a flexible duct structure from an elastomeric material;

forming first and second rigid duct structures, the first and second rigid  
5 duct structures being formed to be relatively more rigid than the flexible duct structure;

coupling the first rigid duct structure to a first end of the flexible duct structure; and

coupling the second rigid duct structure to a second end of the flexible  
10 duct structure such that the flexible duct structure permits the first and second rigid duct structures to be moved relative to one another.

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26. The method of Claim 25, further comprising the steps of:  
providing an elastomeric attachment sleeve; and  
bonding the elastomeric attachment sleeve to an end of the second rigid  
duct structure opposite the flexible duct structure.

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